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ABSTRACT

As the United States and the rest of the world moves into an electronic-driven postindustrial revolution that is replacing the factory industrialism of the beginning of the century, new realities call for change in the workplace and the education system. Declining wages, increased unemployment, and a lowered standard of living have occurred as the vestiges of the factory model are used to try to manage the new work and the new work force. That model, described by Frederick Taylor as breaking down skills so that any job could be learned in 15 minutes, is not suitable for the work and the work force of today and the next century. Instead, if the increasing polarization of those who "have" technology and those who "have not" is to be slowed, work must become increasingly complex and require higher-level thinking skills of workers. Thomas Dewey's idea of teaching many types of skills though an industrial weaving model can be used so that all students gain technological skills as they learn to think and solve problems. In a learning society, the old styles of the division of management and labor must be replaced by cooperative learning and problem solving if the United States is to survive and compete in the global economy. (Contains 13 references.) (KC)

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An Emerging Perspective on Policies for American Work and Education for the Year 2000: Choices We Face

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

It is clear now that we are living in the beginning stages of one of the great social transformations in human history – an electronic-driven post industrial revolution that is replacing the factory industrialism that we opened the century with.

The new realities are: (1) the computer-telecommunications revolution, (2) the emergence of a competitive global market, (3) serious ecological damage, (4) ethnic, racial, sexual diversity, and above all, (5) turbulent change – rapid and unpredictable.

We are struggling to adapt.

In the past fifteen or twenty years we have been confronting a disturbing new phenomenon – an overall decline in the American standard of living.

We staggered through the '80s with lagging productivity and a hollowing out of well-paying manufacturing jobs, 70 per cent of new jobs were lower skill/lower pay jobs. We moved toward a more polarized society. The top well-educated, 25 or 30 per cent prospered, but the median wage fell by 5 per cent. Real wages in 1992 for male high school graduates with up to 5 years of work experience were 27 per cent below 1979 levels.[1] In 1991 21.8 per cent of American children were living in

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poverty (one-third of families with children).[2] In the '80s 50 per cent of additional income went to the top 1 per cent; the middle class shrunk by 4.5 per cent.[3] Another fact of major importance is that in the early '90s the labor pool in third world countries increased by 554 million versus 35 million for mature industrial countries.

So we face a third world awash with hundreds of millions ready to work for much lower wages, and new high-tech competitors from Europe and the Asian rim.

A few words about the social transformation. At the opening of the century the basic problem was how to harness an ill-educated immigrant labor force with power driven factory machinery. Taylor's scientific management offered the solution. Break production into easily learned repetitive tasks. Design work as a dual system with thinking, supervision and control limited to qualified technicians and managers at the top with compliant, unthinking execution by workers on the line. It was the system we entered the '80s with – at a time when the suspicion was growing that it lacked the flexibility to cope with turbulent change.

In 1980, William Duffy, Vice President of General Motors in charge of new plant construction, told us at a Washington University that G.M. used to boast that its production line had been broken into job segments so simple that any task could be learned in fifteen minutes or less – any idiot could do it. If workmanship and morale were poor, the answer was to step up supervision and control. But by 1980 G.M. was beginning to fear that a production process based on increased control by supervisors of a reluctant, unmotivated, antagonistic work force that produced shabby products was not viable for survival.

By 1980 G.M. and other companies were looking for an alternative to Taylorism. In the late '70s they were turning to an alternative theory of work, developed in Scandinavia, called democratic socio-technical work theory. These Scandinavians saw Taylorism as fundamentally flawed. Human work, in post industrialism, they said, is not just technical, it is socio-technical. The technical part refers to the power of electronic technology. But the "socio" refers to the important human qualities to trouble-shoot, innovate and collaborate to meet change.[4]

Taylorism, they said, is guilty of the "technical fix fallacy" – the assumption that all problems will yield to expert-designed technical solutions – it ignores the socio (human) dimension. (Incidentally, the Norwegians made clear that to assure the democratic dimension of socio-technical required strong involvement of democratic unions to represent the voice of the workers.)

In emerging high tech work any organization that fails to tap the brains and commitment of people at work is likely to fail.

By the beginning of the '90s American theorists were making their own analyses of what was happening.

I'll refer to four that I will call our "Informing Gurus."

The first is Robert Reich, author of The World's Work: Preparing for 21st Century Capitalism and the current Secretary of Labor.

His argument is that standardized mass production of the Taylorized assembly line era is obsolete. Our former near monopoly of the American market is gone, as that market is now just another part of the one competitive global market, with everyone in it.

In the '70s while American producers were inventing the bright idea of "planned obsolescence," our Japanese rivals were introducing ideas like "the perfect car," and consumers loved it. The consumers now are global; they have diverse, changing needs, and they have plenty of producers beckoning for their attention.

The result, says Reich, is that American corporations that can no longer generate large earnings from the high-volume production of standard commodities are gradually turning toward serving the diverse special needs of customers dispersed around the globe. They are surviving by shifting from high-volume to high-quality flexible production. National corporations are being transformed into international corporations.

Global communication networks of computers, fax machines, satellites, and modems link engineers, designers, subcontractors, and dealers worldwide. This global system, which is in a constant state of change, is made possible not only by evolving technology but also by four key human skills that drive high-value enterprises:

The skills of "symbolic analysis":[5]

(1) abstraction – the capacity to order and make meaning of the massive flow of information, to shape raw data into workable patterns;

(2) system thinking – the capacity to see the parts in relation to the whole, to see why problems arise;

(3) experimental inquiry – the capacity to set up procedures to test and evaluate alternative ideas;

(4) collaboration – the capacity to engage in active dialogue to get a variety of perspectives and to create consensus when it is necessary.

The result, says Reich, is a growing trend, (a) the top 25 per cent, with the symbolic analytic skills, prosper, (b) those with routine skills are slipping, and (c) those with low skills and the dropouts are surplus, with poverty as their life prospect.

A second guru is Harvard's Shoshanna Zuboff, author of In the Age of the Smart Machine: The Future of Work and Power.[6] She found managers on the frontier of high technology facing an interesting choice. The first, the automating choice, assumes that you can succeed competitively primarily with new technology, retain top down controls and deskill labor. You can go overseas with this model, or cheapen labor at home. G.M's early '80s effort to reform by robots alone was a flop. The flaw, Zuboff says, is that over the long haul automating of itself lacks the flexibility required to remain competitive under turbulent change. By the '90s G.M. had shifted to a new collaborative union/management strategy in its Saturn plant – and produced its most successful product by informating the workers.

In the informating choice, computer technology becomes a source for designing innovative methods of sharing information with the work force – informating them. As the work force is given access to data from an information-rich environment, hierarchical distinctions begin to blur. Managers and workers fashion new roles that permit them to invent creative ways to add value to products and services. With the emergence of "an electronic text," the change is from the manual skills of physical production to work marked by abstract intellective skills. This requires a kind of learning that demands the constructing of meaning from a symbolic medium.

Learning becomes a top priority. Managers begin to see that all workers in the system need access to data so that they can understand the system in order to troubleshoot and innovate. The organizational climate must support the essential conditions of a learning environment – freedom to play with ideas, to experiment, and to enter into dialogue. Thus the dilemma of management: choose the "automating" option which preserves control from the top but, at the cost of the flexibility required to be globally competitive; or choose to "informate" which shifts decision making to people in more democratic work settings – a competitive edge is gained, but at the cost of losing traditional command prerogatives of management.

A third guru is Edward Deming with Total Quality Management (TQM). The only way to survive in a world awash with cheap labor and high tech competitors, he said, is by being superior in quality and innovation – to keep a step ahead of the pack. The key ingredient is a highly educated, competent work force with commitment to a relentless pursuit of quality.[7]

The key to quality is trust between management and the work force. Trust is undermined by the mainline "Management by Objectives" tradition which uses the motivation of fear to pit people against each other. The fixation on merit ratings, Deming says, diverts leadership from its central task which is to create trust, competence, commitment to quality, and even "joy in work." Deming does advocate teaching workers competence with quantitative methods but so that workers themselves can get feedback on their own performance and do their own quality controls for which they take responsibility. At Xerox and Ford,

performance appraisal ratings are based primarily on the performance of the team, and includes contributions to cooperative efforts.

Another point, often overlooked, is Deming's contention that a spiritual issue is involved. We ought to be informed, he says, by the passage in Ecclesiastes that says that we were created "a little higher than the animals," and "a little lower than the angels."

Organizations that treat us as mere organisms miss our distinctive and creative human strengths – our capacities for analyzing, innovating, and the desire to do good work.

The fourth guru is The National Center on Education and the Economy together with people loosely associated with the Clinton administration. The Southern Regional Education board is one of the educational groups putting the ideas into practice. From The National Center came the volume, America's Choice: High Skills or Low Wages.[8] The thesis is that our basic choice is (1) drift toward a polarized low skill/low wage society, or (2) follow Germany and Japan in creating a high skill/high wage society based on two key features: (1) have all front line American workers educated at middle level academic, technical and managerial skills so that they can handle emerging technology, implement quality controls, be involved in self-management groups, and be prepared for continuing learning at new levels, (2) have industrial leaders committed to a collaborative management style that taps the strengths of such a work force.

Such a work force will come from the non-college bound sector of American students, the group that schools are doing their least effective job with.

Proposals for a major overhaul are based on several assumptions: (1) that a high school diploma will be less and less viable for entry into the work world of the year 2000, (2) that President Bush's Project 2000 pointed correctly to one key problem – the need to raise academic achievement – but it failed to recognize that different pedagogical strategies are required to motivate unengaged students, (3) that a whole new attitude needs to be taken toward non-college bound students. Instead of "dumbing down" instruction for students in the general track, give them, as Henry Levin says, the kind of enriched programs that are provided for "the gifted," including experiential, "hands on," active learning.[9]

With these assumptions in mind The National Center is proposing three bold steps: (1) a new school structure, (2) new pedagogical theory, (3) new forms of assessment. All pointed toward the goal of a new World Class Front Line Work Force with midlevel communications, technical and managerial skills.

The ideas for restructuring the system and employing different pedagogical strategies are interrelated. The argument is that cognitive psychology tells us that learning tends to be most effective when tied to real world experience – when more of our human capacities are engaged like our manipulative capacities, opportunities for social interaction, the chance to puzzle things out, to generate hypotheses and act on them.

Where structure is concerned the proposal is to eliminate the ill-functioning three track system created in the era of Taylorism, and replace it with a Tech Prep program. All academic courses will be given at the college-prep level. Non college-bound students (some say all

students) will have academics complemented by various forms of applied/experiential learning. The Tech Prep program, eventually replacing the high school diploma, would involve new linkages between secondary schools and junior colleges, with the goal by 2000 to have all students completing something like the first year of junior college before entering work.

Changes in pedagogical theory are equally as important as curriculum restructuring. Factory era schools were based on a knowledge accumulation concept of learning rooted in the Thorndikean behaviorist tradition. The strategy of "mastery of basal texts plus testing" fails to produce the quality of learning needed for informational era reality. That style has been a demonstrable failure with too many students.

No single formula is proposed but a variety of ideas are in the hopper. Robert Reich with the "Schools To Work Opportunity" bill is pushing hard for the expansion of apprenticeship programs and employer internships where academic study is integrated with work world experiences. Others like Thomas Bailey and Sue Berryman are recommending "cognitive apprenticeships" where apprentice-type methods are applied to academic learning.[10]

A third proposal is to replace standardized testing assessment with a system of performance standards which students could explicitly prepare for with instruments like portfolios, performance tests, exhibitions, etc. The aim would be to have all students by about age 16 meet performance standards in reading, writing, computing and academic subjects benchmarked to world class standards. This would include ability to learn and work alone and in groups to solve problems. The Certificate

for Initial Mastery would certify labor market readiness for high productivity employment. The goal is to create certification programs beginning in Tech Prep and continuing throughout work careers that would improve life-time employment opportunities for all, therefore, avoid a society of "education haves" vs. "have nots." To give dropouts a second chance establish local youth centers through employment training boards with a family-like atmosphere, counseling, basic education and a strong mentoring program.

Finally incentives would be offered to employers to invest 1 per cent of payroll in programs of further education as a permanent part of the American work world. The aim is to build a new philosophy, where the upgrading of learning for a majority of workers throughout their work lives becomes a central aim of policy.

These are some features of a perspective emerging from figures close to the Clinton administration (Mark Tucker, Ray Marshal, Robert Reich, etc.)

I want to suggest another perspective that has not been mentioned.

A possibility that jumps out of all of this is that by 2000 we may be moving toward the idea of making some form of technical education a part of general education for all American students.

I am not sure just what issues that would pose for vocational/technical educators. I do, however, want to call attention to one critical issue that may get overlooked. Pressures will be strong to focus sharply on how to upgrade skills for a high skill work force – a worthy and necessary goal. The question is whether such a sharp focus on utilitarian goals could lead us to miss a deeper educational

opportunity – one more important for our post industrial survival needs perhaps than skill upgrading itself.

We may see the underlying issue by noting John Dewey's way of grappling with the same question as we entered this century. In the 1890s Dewey was simultaneously pioneering his instrumentalist philosophy, and creating his University of Chicago Laboratory School. A noteworthy feature of his school was his decision to make the study of "the occupations" the integrating center of the curriculum (a seemingly strange idea for an elite University of Chicago). His argument was that imaginative study of human occupations contained an extraordinary potential for giving America's children the kind of education for free citizens that was needed to cope with the problems of an era of revolutionary change.

His argument makes sense only by seeing how it was embedded in that instrumental philosophy he was creating – a philosophy informed by the evolutionary perspective which was the great intellectual challenge of his generation. Dewey came to hold that an image of humans as homo faber (humans as tool users) could reveal the unique human strengths that made it possible for humans to experience life in an extraordinarily unique way – to experience life with awareness and growing understanding that could increase through time. He saw our human capacity to use objects as tools, and our "tool of tools," language, emerging hand in hand out of the active occupations of daily life – out of our being occupied both to meet the needs of survival like food, clothing, shelter; and increasingly our need to increase our knowledge of what was happening in order to act more effectively. Beyond that simply to meet our deep need to

understand. How could this be? We may conjecture about pre-history beginnings. Someone first saw the possibility of using a rock as a tool to kill a ground squirrel or as a tool to grind with. Names had to be given to these objects transformed into tools, and language was needed to communicate with companions about what had been learned. Most significantly, the tool of language itself was expanded to the powerful tool of reflective inquiry as we learned to combine the processes of acting, with reflecting on the meaning of our actions, and how these meanings can transform practice.

In evolutionary perspective the introduction of each new revolutionary tool transformed human life. Thus, with the power of domesticated animals harnessed to the wheel we entered an age of agriculture. With the harnessing of the energy of coal and steam power we moved into the stage of industrialism, and now the power of computer technology hurls us into a new industrial era. Each transformation has been marked by wrenching changes in institutions: economic life, government, family, education, religion and the arts. With each new challenge our "tool of tools" language, as the active process of reflective inquiry, itself expanded and grew in power. In its most advanced form Dewey held that it had emerged as the tool of scientific inquiry, the most powerful instrument of human learning to date. It opened new realms of meaning about the world and ourselves, and new means to cope with the turbulent change that scientific inquiry itself produced. His technical definition of education reflected this perspective of transformative learning. Education, he said, is that active "reconstruction of experience

which adds to the meaning of experience, and which increases the ability to direct future subsequent experience."[12]

Dewey explored the meaning of this perspective for the schools of the 1890s. As he saw it, by the twentieth century the long struggle of inquiry had produced the impressive bodies of organized knowledge stored in books and libraries – the glorious understandings that had emerged from the inquiries. From these sources extrapolations had been made into the basal texts of our children.

By 1900 rows of classrooms were being built into massive school buildings where children sat to have the accumulated knowledge transmitted to them. This was a well-intended and notable accomplishment. But from Dewey's instrumentalist concept of learning it contained a fundamental flaw. Knowledge was being transmitted, but the transmission was divorced from the active process of inquiry that had produced it.

For Dewey this was untenable because the inquiry process itself was the most important tool of learning twentieth century children needed. He probed his instrumentalist philosophy to see if there could be an alternative to school seat work. His analysis led him to see that reflective inquiry itself had come out of the daily active occupations of people grappling with the demands of life with the tools at hand. Not so surprising then was his hypothesis that to get students engaged in the occupations and all of the questions and inquiries they opened up would be a better alternative to seat work.

Thus we find the famous occupation of weaving in the Dewey School. Not to meet the new demands for vocational training. But

because he and his teachers could get students involved in the active problem solving, reflective inquiry that the occupations opened up, and they could help students get insight into the revolutionary stage they were living in and understand something of the human history that had got them there.

Thus he got children actively struggling with the processes of shearing wool; carding and spinning it to get it ready for a loom, to produce perhaps a scarf. Facing the nitty gritty of production required them to employ a wide range of learning to complete a difficult task – manipulating tools, reading/researching, interacting socially, communicating, analyzing sources of hang-ups, conjecturing ideas and actions to resolve them. In short, to be involved in the active process of inquiry. As Jim Garrison once put it, they learned that "meaning is made originally, by being occupied with, and operating upon something or other."[13]

But beyond the production process itself they were led to work out historically how the human need to turn raw wool into clothing had been transformed by the introduction of new tools and processes. They could see the changes in human experience that came with changes in technology from primitive hand looms to power driven looms, or now to electronically driven looms of the late twentieth century. And they could be led to evaluate the consequences for human life, good or bad. All of this could be accompanied by exploring connections with academic subject matter.

Thus Dewey argued one can "concentrate the history of all mankind into the evolution of flax, cotton and wool fibers into clothing."

The other technologies of daily life can attain the same potential of liberating learning with one important proviso. They must be approached with an imaginative commitment to plan learning experiences so that they disclose ever-widening context of meaning. Technology, so to speak, can be educative if you dialogue with it. It is monologic if you only train for it.

In the 1990s once again there are strong pressures to upgrade occupational skills for an increasingly high tech work force. What I have been trying to suggest, however, is that technical educators informed by Dewey's instrumentalist philosophy will know that to settle for this focus in a narrow sense will be to miss what Dewey saw as a larger exciting opportunity: that technical educators, in collaboration with academic colleagues, could take students through in-depth studies of human occupations and their technologies in ways that would provide deeply illuminating educational experiences. The qualities of learning needed by a society that must become a learning society to survive and compete. That is the kind of education needed to help students confront the radically new, uncharted challenges of the twenty-first century. We would aim to produce a Work Force which also has the insights and skills to create a viable human society.

This may seem far-fetched. It just might gain support, however, as we get serous about the mind-boggling post industrial realities we are moving into. For example:

- the need to understand our world from a global perspective – and from a multicultural perspective,
- the need to understand that post industrial complexity requires letting go of the demeaning Taylorist dualisms which arrogated to

technical elites the authority to think, and to manipulate and control people. The need to replace such dysfunctional work styles with alternatives that tap the higher human capacities for innovating, reflective learning and collaborative trouble-shooting by all members of the work force – a style that combines democratic values with the power of high technology.

– the need to understand that a relentless concern for quality of product must be extended to a relentless concern for the quality of life. Concern for what Gredes called "the oikos" (our house, that is the global ecology).

– the need to understand that a "high tech learning society" is ill-served by a dualist separation of vocational training from liberal studies; that the times require liberalizing integrations of technical and general studies – both to provide the conceptual skills for new work, and the skills for making quality of life value judgments.

– the need to understand that with all of the power of technology we can still be torn apart as a society if we fail to address the injustice, despair and rage spawned by an economically polarized society that leaves a fifth of the population as useless surplus.

In short, we may be moving into a time when it becomes practical to be moral. I hope so. If it is, we'll have to think to the core what the meaning of that is for the education of our children – and for the workers and managers of our work places.

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